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(54) Moulding method and mould

(57) In order to obtain a piece having a slightly deformed area in which the decorative covering preserves a good aesthetic appearance, this area is first formed and held in place during the subsequent forming of the other areas. The mould consists of two compression thermoforming half-moulds (1) (2), the impressions (8) (9) of which in the slightly deformed area consist of movable elements (10) (11) which can be displaced in housings (12) (13) relative to the remainder of the impressions when the mould is closed.

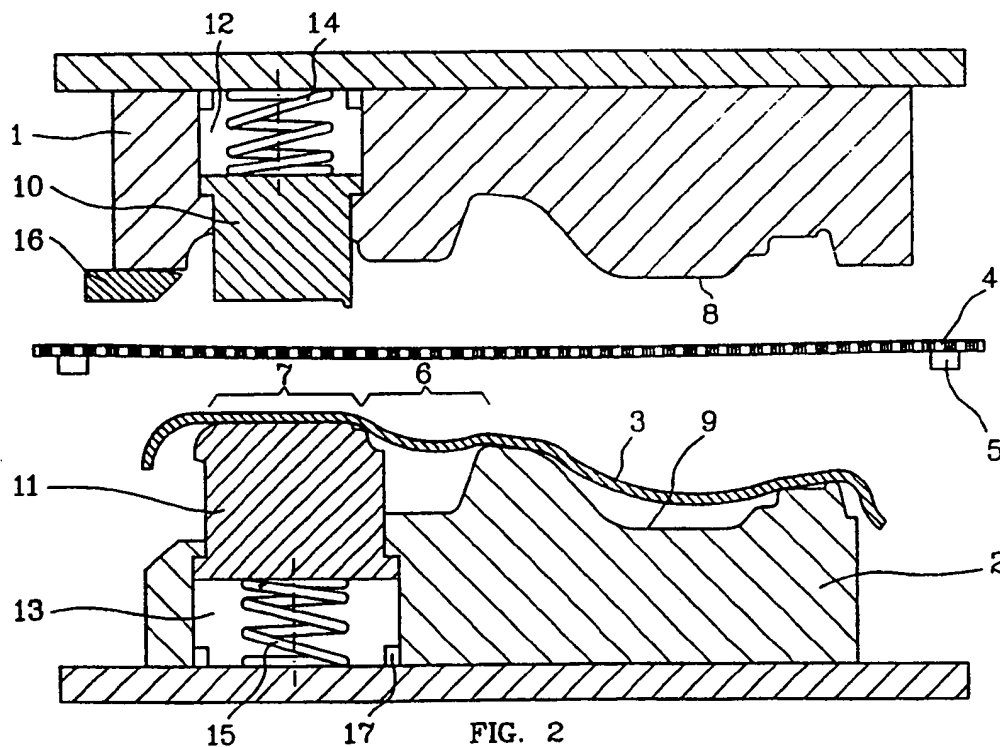


FIG. 2

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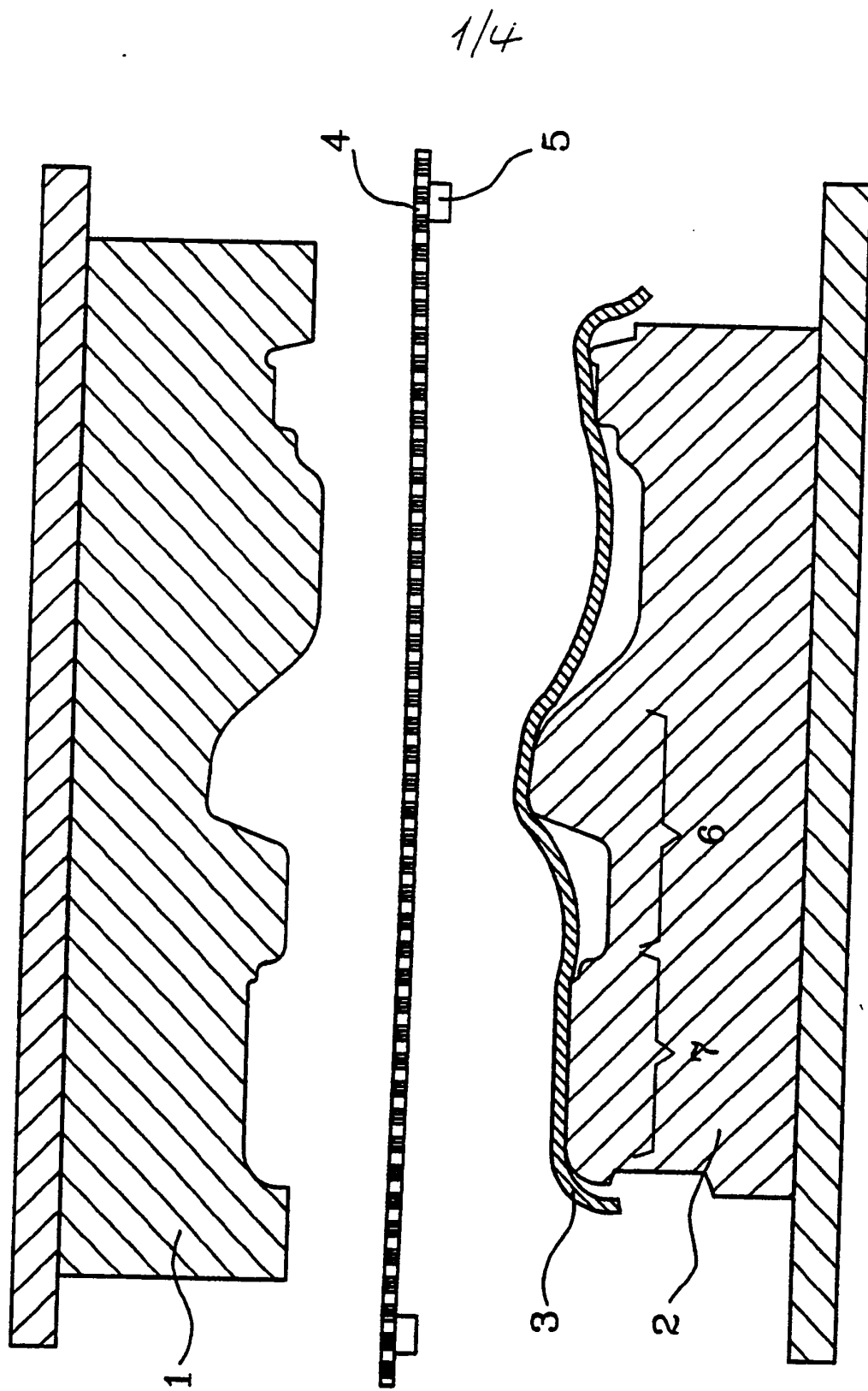
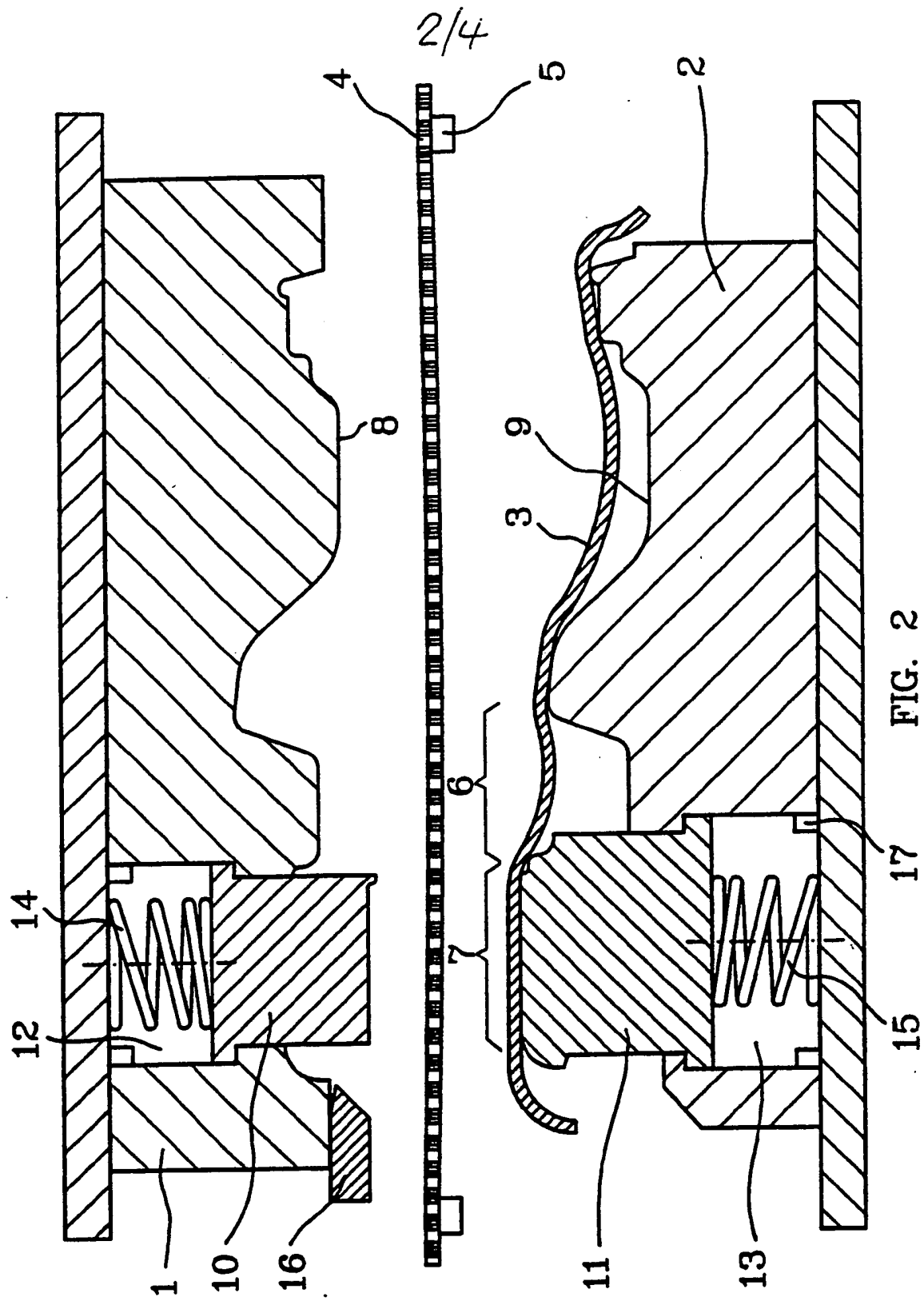


FIG. 1



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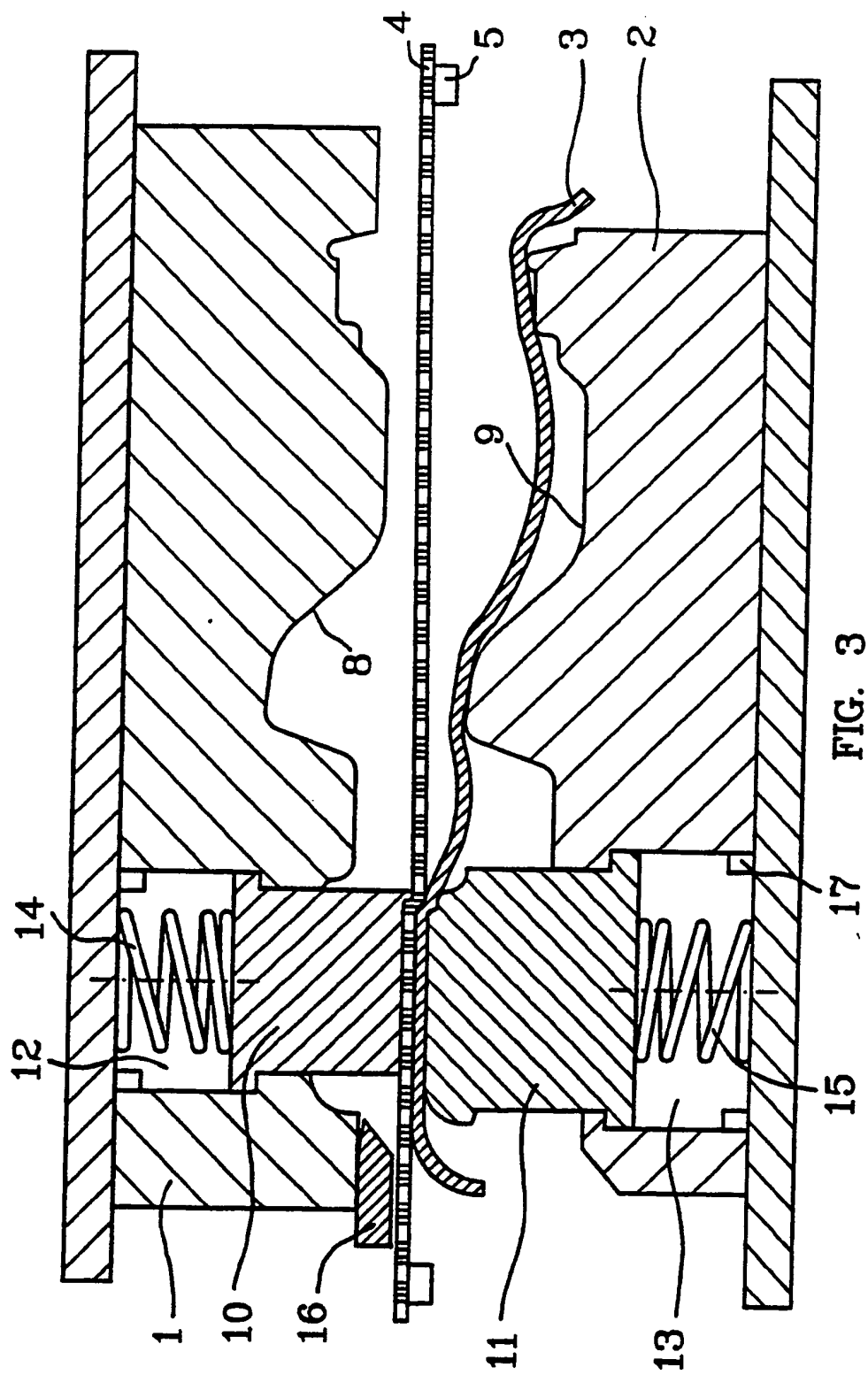


FIG. 3

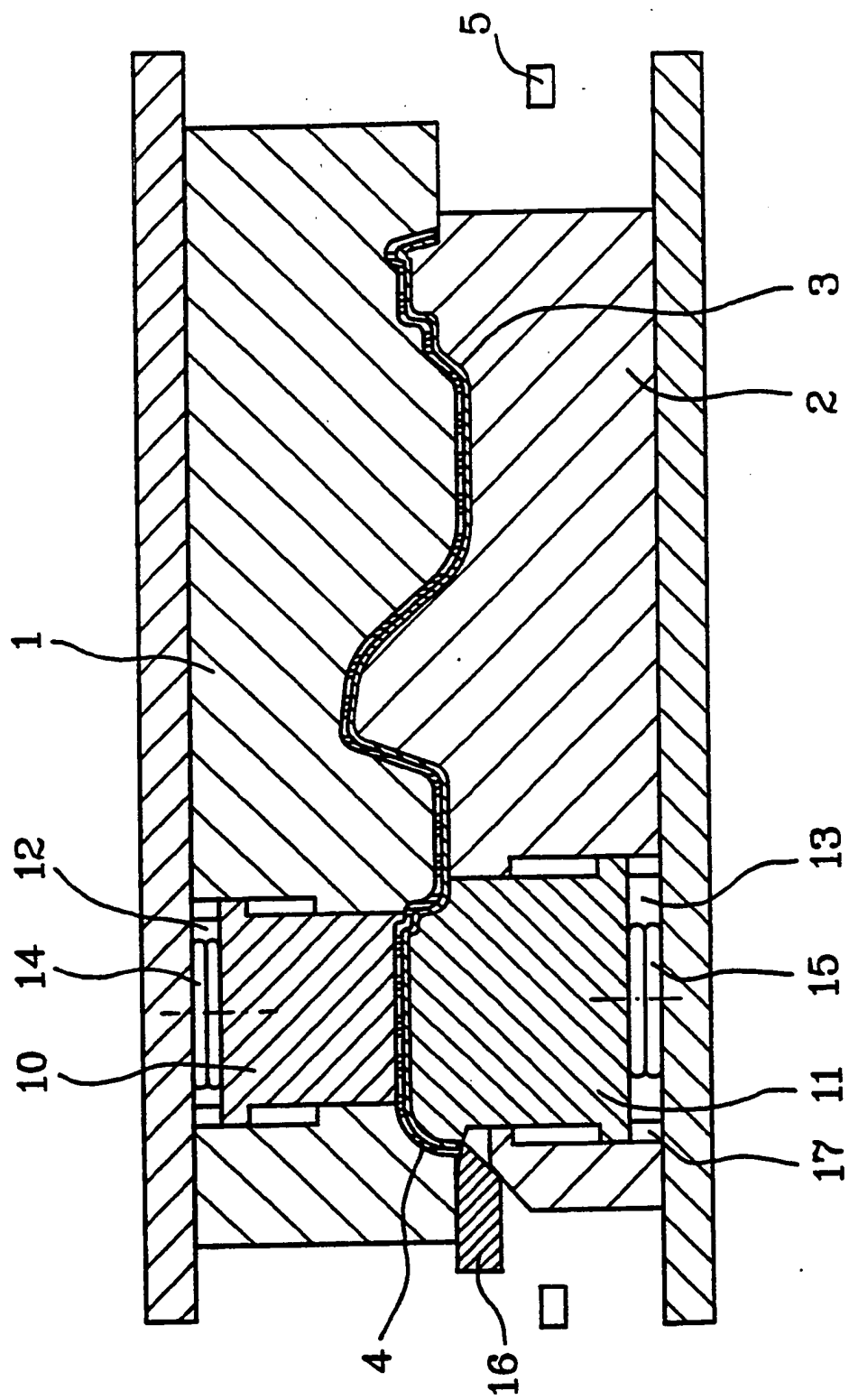


FIG. 4

DESCRIPTION

MOULDING METHOD AND MOULD

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10 The present invention relates to a method for assembling a rigid deformable support and a flexible decorative covering by moulding so as to form an upholstered piece to as well as, a mould which is especially suitable for implementing this method.

15 It is well known, in particular from the US Patents 4,243,456 and 4,328,067, to produce upholstered pieces, such as upholstered pieces for the inside of motor vehicle doors, which consist of a shaped rigid support, such as a metal or plastic support, which is covered by a flexible decorative element such as a textile or an artificial leather. In general, and for reasons of economy, the combining, by adhesive bonding or welding, of the support and the covering is carried out simultaneously with the shaping of the support by drawing or thermoforming.

20 According to the technique generally employed, the plane support, which may be preheated or pre-coated with glue, and the decorative element held at its edges in a frame are introduced between the plates of a press and shaped and assembled simultaneously by the closing of the press.

25 When upholstered pieces such as, for example, upholstered pieces for the inside of motor vehicle doors, are produced according to this technique, the plane support must, in certain areas, be greatly deformed, for example in order to form an arm rest and, consequently,

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during the forming, the corresponding areas of the decorative covering are subjected to substantial drawing and/or stretching forces which affect the regions neighbouring the deformed area. These stretching and/or drawing forces to which the decorative covering is subjected in the neighbouring areas may prove to be very detrimental with respect to the aesthetic appearance of the finished product, in particular when the latter has a decorative pattern as is the case, for example, with striped textiles, grained artificial leathers, etc. In this case, it has indeed been noted that the decorative pattern may be disturbed, for example in a very obvious and only slightly deformed area such as the part situated above the arm rest in the case of the upholstery on the inside of a door, this disturbance producing a very unaesthetic effect.

The object of the present invention is to provide a method which enables this disadvantage to be avoided.

The invention therefore relates to a method for assembling a rigid deformable support and a flexible decorative covering by moulding so as to form an upholstered piece such as an upholstered piece for the inside of a motor vehicle door, the said upholstered piece having at least one greatly deformed area and at least one neighbouring slightly deformed area in which the decorative covering must preserve its appearance, which is characterized in that, in a first stage, only the area which is to be slightly deformed is moulded and, in a second stage, the other areas are moulded, this slightly deformed area being held in place during this second stage.

A greatly deformed area is understood to designate an area where the average depth of deformation is equal to at least 10 times the thickness of the support and a slightly deformed area is understood to designate an area where the average depth of deformation is less

than 10 times the thickness of the support.

The two-stage moulding of the upholstered piece may be carried out by cold-drawing or by vacuum or compression thermoforming, this latter moulding technique being preferred.

According to an embodiment which has proved to be advantageous, the moulding of the area which is to be slightly deformed is carried out under a pressure of 0.1 to 10 bar and the moulding of the other areas is carried out under a pressure of 0.5 to 20 bar.

In the method according to the invention, the slightly deformed area, which is produced in the first stage, gives rise to only a negligible drawing force on the decorative covering which has no effect on the aesthetic appearance and, during the subsequent deeper forming of the neighbouring areas, the decorative covering is held in place against the slightly deformed area and cannot therefore be disturbed at this point by the adjacent deformations which this covering undergoes.

The rigid deformable support employed in the method according to the invention may be a metal foil such as a steel or aluminium foil or a plastic sheet, a preferred support consisting of a polyolefin sheet containing a high proportion of a fibrous filler such as described in US Patent 4,228,116. In this case, the upholstered piece is preferably moulded by compression thermoforming after the support has been brought to a temperature of 170-220°C.

The flexible decorative covering employed in the method according to the invention may be a textile which is woven, knitted or nonwoven from natural or synthetic fibres or a plastic sheet such as a sheet of artificial leather. It is, however, very evident that the method according to the invention proves to be particularly appropriate for decorative coverings having decorative patterns such as, in particular, stripes or grainings



which must not be deformed in the particularly obvious parts of the upholstered pieces to be produced. In particular, when decorative coverings such as grained artificial leathers are employed, the low-pressure moulding of the slightly deformed area enables the graining appearing in this area to be preserved reliably.

The method according to the invention furthermore enables recourse to decorative coverings consisting of at least two different materials joined together by a separating line when the latter is to be situated in the slightly deformed area. In fact, in this case, the method not only enables a reliable positioning of the separating line but also prevents any deformation of the decorative covering in the regions directly adjacent to this line.

The method according to the invention is particularly suitable for producing upholstered pieces for the inside of motor vehicle doors but it is very evident that it may be employed advantageously to produce any other upholstered pieces and in particular pieces for the rear-window shelf of motor vehicles.

The present invention also relates to a mould which is particularly suitable for implementing the method according to the invention when the technique of compression thermoforming is employed.

According to the invention, the mould comprises two compression half-moulds which can be displaced towards each other and one of which has a male impression and the other a female impression of the upholstered piece to be produced, and is characterized in that the areas of the impressions corresponding to the area of the upholstered piece which is to be slightly deformed consist of movable elements which can be displaced in a housing relative to the remainder of the impressions before the mould is completely closed.

When the mould according to the invention is

employed, a support which has been brought beforehand to its moulding temperature and a decorative covering held in a frame between the two half-moulds are provided and, in a first stage, the movable elements are displaced so as to shape the slightly deformed area and then, in a second stage, the mould is completely closed, the slightly deformed area being held in place by the movable elements.

The displacements of the movable elements may be caused by control members such as pressure-adjustable hydraulic or pneumatic jacks or alternatively by adjustable springs.

With an automatic moulding installation, the control members may be programmed in time relative to the control members causing the complete closure of the mould.

In a particularly simple embodiment, the movable elements fitted to each half-mould are held in the moulding position in each half-mould, in other words in the position where they are ejected from their housing in the impressions, for example by means of springs when the mould is open. Consequently, in the course of closing the mould, during a moulding cycle, these elements protruding beyond the impressions first cause the forming of the slightly deformed area of the upholstered piece to be produced and then hold this area in place at an increasing pressure during the forming of the other areas by the complete closure of the mould.

After moulding, when the mould is opened, the movable elements are again ejected from their housing by the springs and, consequently, cause the moulded upholstered piece to be ejected from the impressions of the mould, it then being possible for this piece to be easily extracted from the mould.

It is, moreover, very evident that the mould according to the invention may be equipped with

conventional auxiliary devices such as punches in order to form openings in the moulded piece or means enabling the edges of the moulded piece to be cut off after the mould has been completely closed.

5           The method and the mould according to the present invention are, moreover, explained in more detail in the following description of a particular embodiment and in which reference will be made to the figures of the attached drawings, in which:

- 10       - Fig. 1 diagrammatically illustrates, in cross-section, a conventional compression thermoforming mould employed hitherto for the production of upholstered pieces for the inside of motor vehicle doors;
- 15       - Figs. 2 to 4 illustrate, in cross-section, a mould according to the invention for compression thermoforming an identical upholstered piece shown at different stages of the moulding.

20           During the production by compression thermoforming of an upholstered piece for the inside of a motor vehicle door by means of a conventional mould which does not form part of the scope of the present invention as shown in Fig. 1, a rigid deformable support (3) which has been brought beforehand to its forming temperature and a flexible decorative covering (4) which is generally held

25       at its periphery in a support frame (5) are arranged between the open half-moulds (1) (2) and the moulding and assembly of the support and of the covering takes place by the closing of the mould.

30           However, as is apparent in Fig. 1, the upholstered piece to be formed must have at least one area (6), corresponding to the formation of an arm rest, which is to be greatly deformed, this area (6) neighbouring an area (7) which is to be slightly deformed and which corresponds to the part of the upholstered piece situated

35       above the arm rest, this latter part being especially obvious after mounting on the vehicle. Now during the

5 moulding, the decorative covering is drawn a great deal in the area (6) and this drawing may give rise to a deformation of the decorative covering which has effects in the region of the neighbouring area (7) which is nevertheless slightly deformed, which gives rise to very visible unaesthetic effects.

According to the invention, this disadvantage is overcome by using a compression thermoforming mould according to the invention, as shown in Figs.2 to 4.

10 As is apparent in these figures., the mould consists of two half-moulds (1) (2), the male (8) and female (9) impressions of which reproduce the shape of the upholstered piece to be produced.

15 According to the invention, the portion of the impressions corresponding to the slightly deformed area (7) of the upholstered piece to be produced consists of profiled movable elements (10) and (11) which can slide in the housings (12) and (13) provided in the half-moulds (1) and (2).

20 Furthermore, when the mould is open, these movable elements (10) and (11) are held projecting out of the housings (12) and (13) by means such as springs (14) and (15) so that their profiled part protrudes beyond the impressions (8) and (9) as is apparent in Fig. 2.

25 In order to produce the upholstered piece with the mould as described, it is only necessary to arrange a rigid deformable support (3) which has been brought beforehand to its forming temperature and a flexible decorative covering (4) held at its periphery by a support frame (5) between the two half-moulds (1) and (2), as shown in Fig. 2, and to effect the progressive closing of the mould by bringing together the half-moulds (1) and (2).

30 During this closing, as shown in Fig. 3, the movable elements (10) and (11) are the first to come into contact with the support and with the decorative covering

and thus cause the shaping of the slightly deformed area (7) alone whilst giving rise to a negligible drawing force on this decorative covering. Next, whilst this shaped area is held firmly by the movable elements (10) and (11), the mould closes completely (Fig. 4) and the male and female impressions (8) and (9) cause the remainder of the upholstered piece to be produced to be formed. During this last movement, the elements (10) and (11) holding in place the slightly deformed area are retracted gradually into the housings (12) and (13) against the action of the springs (14) and (15) so that their profiled part is finally situated level with the impressions (8) and (9) when their heel comes into contact with a stop (17) provided in the base of the housings.

It therefore appears that, during the final, forming of the upholstered piece, the support and the decorative covering are held firmly against each other in the region of the slightly deformed area (7) and consequently the decorative covering cannot be disturbed at this point by the substantial drawing forces to which this same decorative covering is subjected outside this area.

When the mould is completely closed, the upholstered piece thus moulded may be cut off at its edges, for example by means of carefully arranged movable blades (16).

After the upholstered piece has been moulded and cooled, the mould is opened by separating the half-moulds (1) and (2). During this movement, the movable elements (10) and (11) are again expelled from the housings (12) and (13) under the action of the springs (14) and (15) and they consequently cause the extraction of the moulded piece from the impressions (8) and (9) of the half-moulds (1) and (2), it then being possible to withdraw this latter piece easily from the mould.

Once the mould has been opened, a new moulding cycle may be started, the movable elements (10) and (11) being ejected from their housing by the action of the springs (14) and (15).

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It is, furthermore, very evident that, in the mould which has just been described, the springs (14) and (15) may be replaced by pneumatic or hydraulic jacks with an adjustable stroke and working pressure.

It will be understood that the invention has been described above purely by way of example, and that various modifications of detail can be made within the ambit of the invention.

CLAIMS

1. Method for assembling a rigid deformable support and a flexible decorative covering by moulding so as to form an upholstered piece such as an upholstered piece for the inside of a motor vehicle door, the said upholstered piece having at least one greatly deformed area and at least one slightly deformed area in which the decorative covering must preserve its appearance, characterized in that, in a first stage, only the area which is to be slightly deformed is moulded and, in a second stage, the other areas are moulded, the slightly deformed area being held in place during this second stage.

2. Method according to Claim 1, characterized in that the moulding is carried out by compression thermofforming between male and female dies.

3. Method according to Claim 1 or 2, characterized in that the moulding of the area which is to be slightly deformed is carried out under a pressure of 0.1 to 10 bar and in that the moulding of the other areas is carried out under a pressure of 0.5 to 20 bar.

4. Method according to any one of Claims 1 to 3, characterized in that the rigid support consists of a polyolefin sheet containing a cellulose fibre filler, the said sheet being brought to a temperature of 170 to 220°C with a view to its moulding.

5. Method according to any one of Claims 1 to 4, characterized in that the decorative covering is a textile with a decorative pattern.

6. Method according to any one of Claims 1 to 4, characterized in that the decorative covering is a grained artificial leather.

7. Mould for the implementation of the method according to any one of Claims 1 to 6, comprising two compression half-moulds which can be displaced towards each other and one of which has a male impression and the other a female impression of the upholstered piece to be

produced, characterized in that the areas of the impressions corresponding to the area of the upholstered piece which is to be slightly deformed consist of movable elements which can be displaced in a housing relative to the remainder of the impressions before the mould is completely closed.

8. Mould according to Claim 7, characterized in that the displacements of the movable elements are caused by control members such as pressure-adjustable hydraulic or pneumatic jacks.

9. Mould according to Claim 7, characterized in that the displacements of the movable elements are controlled by adjustable springs.

10. Mould according to any one of Claims 7 to 9, characterized in that it is equipped with means enabling the edges of the upholstered piece to be cut off after closure.

11. Method according to claim 1, substantially as described with reference to Figures 2, 3 and 4 of the accompanying drawings.

12. Mould according to claim 7, substantially as described with reference to Figures 2, 3 and 4 of the accompanying drawings.

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